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JANAH & ASSOCIATES, P.C. 650 DELANCEY STREET, SUITE 106 SAN FRANCISCO, CA 94107			EXAMINER DHINGRA, RAKESH KUMAR	
			ART UNIT 1763	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/797,286

Applicant(s)

MURUGESH ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 August 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant has amended independent claims 1, 9, 11, 15 by changing "process gas" to "gas".

Claims 1, 3-19 are presently pending and active.

Further, applicant's argument that one skilled in the art would not have a reason to combine Murugesh with Halsey to derive an invention which has two sets of vanes on opposing surfaces of a single gas distributor, has been considered and is found to be persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of new reference by Cheung (US Patent No. 5,158,644) that when combined with Murugesh et al and Halsey et al reads on claim 1 limitations. Accordingly claims 1, 3-6 and 8 have been rejected under 35 USC103 (a) as explained below. Further, remaining claims 7, 9-19 have also been rejected under 35 USC 103 (a) as explained below.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

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Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1, 3 – 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Cheung et al (US Patent No. 5,158,644) and Halsey et al (US Patent No. 6,663,025).**

Regarding Claim 1: Murugesh et al teach an apparatus (for example, Figure 1A, 2A, 2B, 3) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

(a) a tubular post (hub) 259 comprising a gas inlet to receive a gas and a gas outlet that includes first and second terminus 247a, 247b;

(b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface and comprising an outer perimeter;

(c) first ridges (plurality of first vanes) 245 on the first surface of the baffle, first vanes configured to direct the gas expelled from gas outlets 247 (first terminus) across process chamber 30 surface, each first vane 245 comprising curves from the hub to the outer perimeter of the baffle. Murugesh et al further teach that thicker deposits are formed at regions in the chamber that are near gas inlet nozzles surface, and the topography of the baffle surface is adapted to spread the cleaning gas preferentially across the pre-defined surface that is to be cleaned. Murugesh et al additionally teach that a pre-defined surface of the ridges 245 are shaped and sized to enable direct gas at pre-selected chamber surfaces. Murugesh et al also teach that gas distributor (Figure 3) can also have two outlets 85, 247 (first and second terminus) {for example, Column 5, line 40 to Column 8, line 8}.

Murugesh et al do not teach a plurality of second vanes on the second surface of the baffle, the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor.

Cheung et al teach an apparatus for plasma self-cleaning comprising a chamber 10 with upper and lower electrodes 30, 12 respectively. Cheung et al further teach that upper electrode includes gas inlet baffle 11. Cheung et al also teach that surface of baffle 11 (facing plasma) can be cleaned by generating a localized plasma between the gas inlet baffle 11 and lower electrode 12, by controlling the gas flow and the gas pressure such that effective cleaning of baffle 11 surface (gas distributor) can be obtained.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to control gas flow and pressure at the second surface of the baffle as taught by Cheung et al in the apparatus of Murugesh et al to obtain effective cleaning of gas distributor.

Murugesh et al in view of Cheung et al teach control of gas flow on the second surface of the baffle for cleaning of the same, and also teach vanes on baffle surface can be adapted to effectively clean desired surfaces in the chamber, but do not teach a plurality of second vanes on the second surface of the baffle, the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor.

Halsey et al teach an apparatus (Figures 2, 3A-C, 4A, 4B) that includes a gas diffuser 200 that has a gas inlet nozzle 302 and guide vanes 210, 212 on the (second surface of body (baffle) 202 {towards the chamber}, so that vanes 210, 212 enable flow of gas along the surface 406 (second surface) of the diffuser 200 (baffle). Halsey et al further teach that spacing and disposition of vanes 210, 212 can be adjusted to obtain desired gas flow conditions {for example, column 5, line 45 to column 7, line 40}. It would be obvious to provide plurality of second vanes on the second surface of the baffle as taught by Halsey et al to obtain effective cleaning of second surface of baffle (gas distributor) in view of teachings of Murugesh et al and Cheung et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Murugesh et al in view of Cheung et al by adding second vanes on the second surface of baffle plate as taught by Halsey et al to obtain effective cleaning of the gas distributor (Figure 3-Murugesh et al) {Column 3, lines 1-10}.

Regarding Claims 3: Murugesh et al teach (Figures 2A, 2B) that ridge (first vanes) 245 comprises taper from the hub 259 to the outer perimeter of the baffle 248 (Column 7, lines 1-60).

Regarding Claim 4: Murugesh et al teach (Figure 1A) that gas distributor (including tubular post 259) 215 comprises first and second channels, and the gas outlet comprises the terminus of the first channels (247a) and the terminus of the second channels (247b) {Column 6, lines 20-50}.

Regarding Claims 5, 6: Halsey et al teach (Figures 3A-3C, 4B) that guide vanes (second vanes) 210, 212 comprise a plurality of surfaces that are inclined to the second surface of the body (baffle) 202, at least a portion of the inclined surfaces being below the terminus (exit point for gases flowing out of nozzle 302) of the second channels {Column 5, lines 45-55 and Column 7, lines 20-40}. Halsey et al also teach that number of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

Regarding Claim 8: Halsey et al teach that body 202 (baffle surface) can have any shape suitable for expanding gas flow (implies that shape or angle of guide vanes relative to body could be optimized) {Column 5, lines 15-35}.

**Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Cheung et al (US Patent No. 5,158,644) and Halsey et al (US Patent No. 6,663,025) as applied to claims 1, 3-6, 8 and further in view of Wheat et al (US PG PUB No. 2003/0116278).**

Regarding Claim 7: Murugesh et al in view of Cheung et al and Halsey et al teach all limitations of the claim including second vanes on second surface of baffle plate and that shape and location of vanes enable control the direction of gas flow.

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Muruges et al in view of Cheung et al and Halsey et al do not teach that second vanes comprise plurality of wedges.

Wheat et al teach an apparatus (Figure 1) that includes a gas distributor 10 with an inlet tube 14, an outlet manifold 18 with gas outlet holes 30 and wedge-shaped baffle deflectors (vanes) 34 proximate each hole. Wheat et al also teach that the deflectors 34 can have other configurations (as per gas flow considerations) {Paragraph 0032}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use wedge shaped deflectors (vanes) as taught by Wheat et al in the apparatus of Muruges et al in view of Cheung et al and Halsey et al to provide the required flow path to the gases exiting from the gas outlet holes (Paragraph 0012).

**Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Muruges et al (US Patent No. 6,450,117) in view of Cheung et al (US Patent No. 5,158,644), Halsey et al (US Patent No. 6,663,025) and Frijlink (US PG PUB No. 2004/0200412).**

Regarding Claim 9: Muruges et al in view of Cheung et al and Halsey et al teach all limitations of the claim including that the apparatus has a hub and a baffle with first and second vanes.

Muruges et al in view of Cheung et al Halsey et al do not teach that hub has a gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas introduction arrangement that comprises concentric funnels (like gas feed through tube) that include inlet 1A for first precursor gas and a separate inlet 1B for second precursor gas and where gas flow through inlet 1A by-passes the first gas (to by-pass the vanes) and enters the chamber (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas feed-through tube as taught by Frijlink in the apparatus of Muruges et al in view of Cheung et al and Halsey et al to enable supply plurality of gases through gas distributor.

**Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Cheung et al (US Patent No. 5,158,644) in view of Halsey et al (US Patent No. 6,663,025) as applied to claims 1, 3-6, 8 and further in view of Horie et al (US Patent No. 6,132,512).**

Regarding Claim 10: Murugesh et al in view of Cheung et al and Halsey et al teach all limitations of the claim (as explained above under claims 1, 9) including a combination (for process and cleaning gas) gas distributor comprising of cleaning gas distributor 200 and process gas distributor 65 having gas inlet and gas outlets 247 (Murugesh et al – Figure 3, column 7, line 65 to column 8, line 10).

Murugesh et al in view of Cheung et al and Halsey et al do not teach process gas distributor with showerhead faceplate. However use of showerhead as gas inlet structure is known in the art as per reference cited hereunder.

Horie et al teach an apparatus (Figures 13-15) that includes a gas ejection head having a gas supply head unit 50 with a double walled structure and a showerhead type structure comprising of front nozzle disk 42 and rear nozzle disk 41, and where an outer tube 51 (with a first gas) is connected to gas supply port 46 and inner tube 52 (like for a second gas supply) is connected to showerhead plate 42 with holes 42-1 (Column 12, lines 15-68).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use process gas distributor with showerhead type gas distribution faceplate as taught by Horie et al in the apparatus of Murugesh et al in view of Cheung et al and Halsey et al to distribute gas uniformly in the chamber.

**Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redeker et al (US Patent No. 6,182,602) in view of Murugesh et al (US Patent No. 6,450,117), Cheung et al (US**

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**patent No. 5,158,644), Halsey et al (US Patent No. 6,663,025) and Frijlink (US PG PUB No. 2004/0200412).**

Regarding Claim 11: Redeker et al teach an apparatus (for example, Figures 1, 13, 16) that includes a center gas feed (gas distributor) 312 to distribute a gas from an external source across surfaces in a substrate processing chamber 12 having a wall with a cavity, the gas distributor comprising:

(a) a hub 334 that fits into the cavity in the wall of the chamber, the hub comprising (i) a plurality of first channels 342 that mate with the cavity, the first channels comprising openings and a terminus, the openings capable of receiving the gas from the external source (ii) a second channel 304 capable of receiving the gas from the terminus of the first channels (for example, column 16, line 60 to column 18, line 48).

Redeker et al do not teach:

first channels along external surface of hub;

a baffle plate extending radially outward from the hub, the baffle plate comprising a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels;

plurality of first vanes on the first surface of the baffle plate, each first vane comprising an arcuate plate that curves outward from the hub, the first vanes direct the gas expelled from first terminus across the surfaces of the chamber,,

plurality of second vanes on the second surface of the baffle plate, that direct gas from second terminus across second surface of baffle plate and each second vane comprising a surface inclined to the second surface of the baffle plate;

(iii) a gas feed-through tube that allows the gas to bypass the first and second set of vanes.

Murugesh et al teach an apparatus (for example, Figure 1A, 2A, 2B, 3) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

(a) a tubular post (hub) 259 comprising a gas inlet to receive a gas and a gas outlet,

(b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface and comprising an outer perimeter,

(c) first ridges (plurality of first vanes) 245 on the first surface of the baffle, first vanes configured to direct the gas expelled from gas outlets 247 (first terminus) across process chamber 30 surface, each first vane 245 comprising curves from the hub to the outer perimeter of the baffle. Murugesh et al further teach that thicker deposits are formed at regions in the chamber that are near gas inlet nozzles surface, and the topography of the baffle surface is adapted to spread the cleaning gas preferentially across the pre-defined surface that is to be cleaned. Murugesh et al additionally teach that a pre-defined surface of the ridges 245 are shaped and sized to enable direct gas at pre-selected chamber surfaces. Murugesh et al also teach that gas distributor (Figure 3) can also have two outlets 85, 247 (first and second terminus) {for example, Column 5, line 40 to Column 8, line 8}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub and baffle plate configuration as taught by Murugesh et al in the apparatus of Redeker et al to enable uniformly remove residues having variable thickness or non-uniform chemical compositions without eroding underlying chamber surfaces (Column 1, lines 55-60).

Redeker et al in view of Murugesh et al do not teach second vanes on the second surface of the baffle and where the second vanes direct the received gas across the second surface of the baffle and a gas feed-through tube that allows the gas to bypass the first and second set of vanes.

Cheung et al teach an apparatus for plasma self-cleaning comprising a chamber 10 with upper and lower electrodes 30, 12 respectively. Cheung et al further teach that upper electrode includes gas inlet baffle 11. Cheung et al also teach that surface of baffle 11 (facing plasma) can be cleaned by generating a localized plasma between the gas inlet baffle 11 and lower electrode 12, by controlling the gas flow and the gas pressure such that effective cleaning of baffle 11 surface (gas distributor) can be obtained.

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Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to control gas flow and pressure at the second surface of the baffle as taught by Cheung et al in the apparatus of Redeker et al in view of Murugesh et al to obtain effective cleaning of gas distributor.

Redeker et al in view of Murugesh et al and Cheung et al teach control of gas flow on the second surface of the baffle for cleaning of the same, and also teach vanes baffle surface can be adapted to effectively clean desired surfaces in the chamber, but do not teach a plurality of second vanes on the second surface of the baffle, the plurality of second vanes configured to direct the process gas expelled from the second terminus across the second surface of the baffle to clean the gas distributor.

Halsey et al teach an apparatus (Figures 2, 3A-C, 4A, 4B) that includes a gas diffuser 200 that has a gas inlet nozzle 302 and guide vanes 210, 212 on the (second surface of body (baffle) 202 {towards the chamber}), so that vanes 210, 212 enable flow of gas along the surface 406 (second surface) of the diffuser 200 (baffle). Halsey et al further teach that spacing and disposition of vanes 210, 212 can be adjusted to obtain desired gas flow conditions {column 5, line 45 to column 7, line 40}. It would be obvious to provide plurality of second vanes on the second surface of the baffle as taught by Halsey et al to obtain effective cleaning of second surface of baffle (gas distributor) in view of teachings of Murugesh et al and Cheung et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Redeker et al in view of Murugesh et al and Cheung et al by adding second vanes on the second surface of baffle plate as taught by Halsey et al to obtain effective cleaning of gas distributor.

Redeker et al in view of Murugesh et al, Cheung et al and Halsey et al do not teach gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (gas feed through tube) that includes inlet 1A for first precursor gas and inlet 1B for second precursor (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas fed through tube as taught by Frijlink in the apparatus of Redeker et al in view of Murugesh et al, Cheung et al and Halsey et al to enable supply plurality of gases through gas distributor.

Regarding Claim 12: Murugesh et al teach (Figures 2A, 2B) the baffle 251 further comprises an outer perimeter, and wherein each ridge (first vane) 245 comprises an arcuate plate that curves outward from the hub to the outer perimeter of the baffle. Murugesh et al also teach that ridges (vanes) 245 are shaped and sized so that so as to enable fresh flow of gases over selected chamber surfaces (Column 7, lines 12-30).

Regarding Claims 13, 14: Halsey et al teach (Figure 4B) that guide vanes (second vanes) 210, 212 comprise a plurality of adjacent surfaces that are inclined to the second surface of the body (baffle) 202, at least a portion of the inclined surfaces being below the terminus (exit point for gases flowing out of nozzle 302) of the second channels {Figure 3A-3C, Column 5, lines 45-55 and Column 7, lines 20-40}. Halsey et al also teach the pairs of inclined surfaces (of guide vanes 210, 212) are oriented to direct the gas across expansion surface (sector of the second surface of the baffle plate) 464. Halsey et al also teach that number and location of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

**Claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Cheung et al (US Patent No. 5,158,644), Halsey et al (US Patent No. 6,663,025) and Frijlink (US PG PUB No. 2004/0200412).**

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Regarding Claims 15, 17: Murugesh et al in view of Cheung et al and Halsey et al teach all limitations of the claim (as already explained above under claim 1) including that the apparatus has a hub and a baffle with first and second vanes and also includes remote chamber (remote plasma source 176 – Murugesh et al, Figure 1A).

Murugesh et al in view of Cheung et al Halsey et al do not teach that hub has a gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas introduction arrangement that comprises concentric funnels (like gas feed through tube) that include inlet 1A for first precursor gas and a separate inlet 1B for second precursor gas and where gas flow through inlet 1A by-passes the first gas (to by-pass the vanes) and enters the chamber (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas feed-through tube as taught by Frijlink in the apparatus of Murugesh et al in view of Cheung et al and Halsey et al to enable supply plurality of gases through gas distributor.

Regarding Claim 16: Murugesh et al teach (Figure 1c) that remote plasma chamber 130 comprises gas supply (inlet) 125, gas energizer (activator) 175, gas conduit (outlet) 170 [Column 4, line 40 to Column 5, line 40].

Regarding Claim 18: Murugesh et al in view of Cheung et al and Halsey et al teach (Figure 4B) that the pairs of inclined surfaces (of guide vanes 210, 212) are oriented to direct the gas coming from remote source across the expansion surface (of gas distributor) 464. Halsey et al also teach that number of guide vanes and their location may be optimized as per process requirements (Column 5, lines 30-35).

Regarding Claim 19: Murugesh et al in view of Cheung et al, Halsey et al and Frijlink teach an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (like gas feed through tube) that is capable of distributing energized gas into process chamber from a remote chamber (Paragraph 0024).

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*Conclusion*


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh K. Dhingra



Karla Moore  
Primary Examiner  
Art Unit 1763